GROUNDWATER

Results for 2003

The following groundwater results represent only those monitoring activities conducted to demonstrate compliance with INEEL Wastewater Land Application Permits. Groundwater monitoring is conducted at the following Wastewater Land Application Permitted locations:

- Idaho Nuclear Technology Engineering Center (INTEC) New Percolation Ponds
- INTEC Sewage Treatment Plant
- Test Area North/Technical Support Facility Sewage Treatment Plant.

The sampling locations, frequency, and analyses to be performed for all Wastewater Land Application Permit groundwater monitoring activities were negotiated with the State of Idaho during the approval stages of the respective Wastewater Land Application Permits.

Locations
Sampling locations (i.e., monitoring wells) were selected based on the hydrogeology of the area to best determine the impact to the subsurface and the Snake River Plain Aquifer by liquid effluent discharges. The individual Wastewater Land Application Permits identify specific monitoring wells as compliance points and specific wells as background aquifer or perched water monitoring points.

Frequency
Sampling occurs semiannually, in April and October, as required by the permits.

Analytical Parameters
Analytical parameters were chosen to match the contaminants commonly found in the liquid effluent discharge to the respective ponds and trenches. The Wastewater Land Application Permits list specific required parameters to monitor for in each of these wells. The compliance point monitoring wells are required to meet the primary and secondary constituent standards (IDAPA 58.01.11, "Groundwater Quality Rule") for applicable parameters.

QUICK FACTS

- 13 groundwater monitoring wells sampled in April and October of each year
- 3 Wastewater Land Application Permits require groundwater sampling

DEFINITIONS

Aquifer
A layer of water-saturated rock or soil through which water flows in a quantity useful to people. The rate of flow depends upon porosity and permeability, and the slope of the water table. Groundwater in aquifers usually flows very slowly, only a few inches to a few feet per day.

Groundwater
Water that soaks into the ground and percolates downward through rock or soil pores until it is stopped by an impermeable layer. Natural sources are rainfall, snowmelt, and water that seep into the ground beneath streams, rivers, and lakes. Other sources can include irrigated fields, canals, wastewater drainfields, injection wells, leaking pipes, and industrial cooling ponds.

Perched Water
Groundwater that collects above a layer of relatively impermeable material, such as clay, and then slowly moves downward to the aquifer. Perched water zones are often present beneath reservoirs and industrial facilities, but disappear when the surface water source is eliminated.

FOR MORE INFORMATION

Visit our Web site at:
http://cleanup.inel.gov/monitoring/

Read the 2003 Annual Site Environmental Report or the 2003 Wastewater Land Application Site Performance Reports for the INEEL available in DOE Public Reading Rooms or at our Web site.
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RESULTS SUMMARY

INTEC New Percolation Ponds
Aquifer wells ICPP-MON-A-165 and ICPP-MON-A166, and perched water wells ICPP-MON-V-200 and ICPP-MON-V-212 are permit compliance points. Aquifer well ICPP-MON-A-167 and perched water well ICPP-MON-V-191 are listed in the permit as upgradient, noncompliance points. All permit-required samples are taken as unfiltered samples. Perched water well ICPP-MON-V-191 was dry during both of the 2003 sampling events. ICPP-MON-V-191 is expected to remain dry until the Big Lost River flows sufficiently to recharge the perched water at this well.

Secondary constituent standard (SCS) exceedences during 2003:

	ICPP-MON-A-166 (Aquifer Compliance Point)	**ICPP-MON-A-167** (Background Aquifer Well)	**ICPP-MON-V-200** (Perched Water Compliance Point)
Aluminum	April and October	April and October	October
Iron	October	April and October	April and October
Manganese	April and October	April and October	—
Total dissolved solids	—	—	October

No other primary or secondary constituent standards were exceeded in any of the wells sampled.

As stated previously, all permit-required samples are collected as unfiltered samples. However, during the October 2003 sampling event, an additional filtered (45 micron) sample was collected from wells ICPP-MON-A-166, ICPP-MON-A-167, and ICPP-MON-V-200. The aluminum, iron, and manganese concentrations in all three wells were significantly less in the filtered samples and were all below the applicable SCSs. Removal of the metals by filtering indicates the metals are associated with suspended solids and not dissolved in the groundwater. The concentrations of aluminum, iron, and manganese in the wastewater discharged to the INTEC New Percolation Ponds is considerably lower than the concentrations in these three wells. Therefore, the wastewater is not considered to be the source of these three metals. Possible sources of these metals in the suspended solids are natural interbed sediments and well construction materials (e.g., bentonite, casing). Further evaluation to determine the source of the metals is planned for 2004.

INTEC Sewage Treatment Plant
Similar to previous years, chloride and nitrate concentrations were slightly elevated in the aquifer compliance well as compared to the facility background upgradient well, and concentrations were largely nondetectable for the remaining analytical parameters.

One perched water surveillance well is used as an indicator of soil treatment efficiency rather than as a point of compliance. As in previous years, total dissolved solids and chloride in the perched water approximate that of the Sewage Treatment Plant (STP) effluent. The October 2003 total dissolved solids concentration was above the SCS of 500 mg/L. Both fecal and total coliform were detected in the October 2003 sample from the perched water surveillance well. The treatment processes at the INTEC STP do not include disinfection of the wastewater and the probable source of coliform bacteria found in the perched water well is the INTEC STP effluent. The concentration of nitrate in the April 2003 sample from the perched water surveillance well exceeded the primary constituent level of 10 mg/L. Weekly trench rotation will continue at the INTEC STP to increase denitrification in the soil column.

No other primary or secondary constituent standards were exceeded in any of the permit-required wells sampled.

Test Area North/Technical Support Facility Sewage Treatment Plant
Per the Wastewater Land Application Permit, three monitoring wells are used as points of compliance for the Test Area North/Technical Support Facility Sewage Treatment Plant: TANT-MON-A-002, TAN-10A, and TAN-13A. TANT-MON-A-001 is identified as the background aquifer well. Permit exceedences are summarized in the following table.

Parameter	Monitoring Well	Occurrence
Iron	TAN-10A (compliance point)	April and October
Total coliform	TANT-MON-A-001 (background well)	October
	TAN-MON-A-002 (compliance point)	October
	TAN-13A (compliance point)	October

The elevated iron concentrations are believed to be related to the condition of the well casing, coupled with the residual effects of replacing the galvanized riser pipes in late 2002. Video logging performed on TAN-10A in 2003 showed the carbon steel well casing was corroded most of the way to the water table, and iron concentrations in this well have increased after the well maintenance was performed.

Given that total coliform was identified in the background well, the source of the total coliform identified in the three wells in October 2003 was not confirmed as being from the Test Area North/Technical Support Facility Sewage Treatment Plant.

No other primary or secondary constituent standards were exceeded in any of the permit-required wells sampled.